

CLAIMS

What is claimed is:

- 1 1. In a computer system having I/O components and a file system existing within a volume
2 group comprised of storage media, a method for substantially preventing I/O failure due to
3 insufficient storage space within the file system, said method comprising:
4 determining that a received I/O operation directed at said file system requires more storage
5 space than is currently available within said file system;
6 dynamically expanding the storage space available within said file system to accommodate
7 said I/O operation, wherein additional space on said volume group is allocated to said file
8 system; and
9 subsequently completing said I/O operation within said file system;
10 wherein said dynamically expanding step and said subsequently completing step are both
11 completed without user input and/or activation.
- 1 2. The method of Claim 1, wherein said dynamically expanding step includes assigning
2 reserve storage space existing within said volume group to a logical volume hosting said file
3 system.
- 1 3. The method of Claim 1, wherein said subsequently completing step comprises restarting
2 said I/O operation within kernel space without requiring user input.
- 1 4. The method of Claim 1, further comprising issuing a notification indicating that said
2 dynamically expanding step is being completed.
- 1 5. The method of Claim 1, further comprising:
2 signaling a logical volume manager (LVM) of a need for additional storage space for
3 completing said I/O;

4 completing an automatic expansion of a logical volume hosting said file system, wherein
5 said dynamically expanding step expands said file system into available space within said logical
6 volume following said automatic expansion.

1 6. The method of Claim 5, wherein said signaling step is completed via an I/O failure
2 response (FR) daemon that coordinates communication between control blocks in the kernel
3 space and the LVM.

1 7. The method of Claim 1, wherein said determining step comprises:
2 parsing parameters from said I/O command for a size of said storage space required to
3 complete said I/O operation; and
4 comparing said storage space with an available storage space size within said file system.

1 8. The method of Claim 1, wherein said dynamically expanding step comprises:
2 determining that said storage space is available within said reserve space; and
3 expanding said file system to include a preset amount of space from said reserve space.

1 9. The method of Claim 5, wherein said expanding step includes iteratively expanding said
2 file system by said preset amount of space until a total space within said file system is sufficient
3 to accommodate said I/O operation.

1 10. The method of Claim 1, wherein said dynamically expanding step comprises:
2 calculating an amount of additional space required to complete said I/O, with
3 consideration of currently available space within said file system ; and
4 dynamically expanding said file system by at least said amount of additional space
5 required.

1 11. In a computer system having I/O components and a file system existing within a volume
2 group comprised of storage media, a system for mitigating I/O failure due to insufficient storage
3 space within the file system, said system comprising:

4 means for determining that a received I/O operation directed at said file system requires
5 more storage space than is currently available within said file system;
6 means for dynamically expanding the storage space available within said file system to
7 accommodate said I/O operation, wherein additional space on said volume group is allocated to
8 said file system; and
9 means for subsequently completing said I/O operation within said file system;
10 wherein said means for dynamically expanding and said means for subsequently
11 completing both initiate without user input and/or activation.

1 12. The system of Claim 11, wherein:
2 said means for dynamically expanding includes means for assigning reserve storage
3 space existing within said volume group to a logical volume hosting said file system; and
4 said means for subsequently completing comprises means for restarting said I/O
5 operation within kernel space without requiring user input.

1 13. The system of Claim 11, further comprising means for issuing a notification indicating
2 that said dynamically expanding step is being completed.

1 14. The system of Claim 11, further comprising:
2 means for signaling a logical volume manager (LVM) of a need for additional storage
3 space for completing said I/O; and
4 means for enabling said LVM to complete an automatic expansion of a logical volume
5 hosting the file system, wherein said LVM signals said file system of a completion of said
6 automatic expansion.

1 15. The system of Claim 11, further comprising an I/O failure response (FR) daemon that
2 coordinates communication between control blocks in the kernel space and the LVM.

1 16. The system of Claim 11, wherein said means for dynamically expanding comprises:
2 means for determining that said storage space is available within said reserve space; and

3 means for expanding said file system to include a preset amount of space from said
4 reserve space, wherein said means for expanding reiteratively expands said file system by said
5 preset amount of space until a total space within said file system is sufficient to accommodate
6 said I/O operation.

1 17. The system of Claim 11, wherein said dynamically expanding step comprises:
2 means for calculating an amount of space required to complete said I/O given a value of
3 currently available space within said file system ; and
4 means for dynamically expanding said file system by at least said amount of space
5 required.

1 18. The system of Claim 11, wherein:
2 said means for determining includes I/O CC and OS functional logic;
3 said means for dynamically expanding includes said LVM; and
4 said means for notifying includes an I/O FR daemon that bridges communication between
5 said I/O CC at an OS level and said LVM at an application level within said computer system.

1 19. A computer program product comprising:
2 a computer readable medium; and
3 computer program code on said computer readable medium for substantially preventing
4 I/O failure due to storage space restrictions within a file system, said program code further
5 comprising code for:
6 determining that a received I/O operation directed at said file system requires more
7 storage space than is currently available within said file system;
8 dynamically expanding the storage space available within said file system to
9 accommodate said I/O operation, wherein additional space on said volume group is allocated to
10 said file system; and
11 subsequently completing said I/O operation within said file system.

1 20. The computer program product of Claim 19, further comprising code for:

2 assigning reserve storage space existing within said volume group to a logical volume
3 hosting said file system; and
4 restarting said I/O operation within kernel space without requiring user input;
5 wherein said code for implementing said dynamically expanding step and said
6 subsequently completing step are executed without user input and/or activation..

1 21. The computer program product of Claim 19, further comprising code for:

2 implementing an I/O failure response (FR) daemon that coordinates communication
3 between control blocks in the kernel space and the LVM, wherein said I/O FR completes a set of
4 functional operations including:

5 signaling a logical volume manager (LVM) of a need for additional storage space
6 for completing said I/O;

7 issuing a notification indicating that said dynamically expanding step is being
8 completed; and

9 initiating a restart of said I/O operation once said expansion completes;

10 wherein said LVM completes an automatic expansion of a logical volume hosting
11 said file system, and said dynamically expanding step expands said file system into
12 available space within said logical volume following said automatic expansion.

1 22. The computer program product of Claim 19, wherein said code for determining
2 comprises additional code for:

3 parsing parameters from said I/O command for a storage space required to complete said
4 I/O operation; and

5 comparing said storage space with an available storage space within said file system.

1 23. The computer program product of Claim 19, wherein said code for dynamically
2 expanding comprises code for:

3 determining that said storage space is available within said reserve space;

4 expanding said file system to include a preset amount of space from said reserve space;

5 and

6 iteratively expanding said file system by said preset amount of space until a total space
7 within said file system is sufficient to accommodate said I/O operation.

1 24. The computer program product of Claim 19, wherein when there is not sufficient space
2 within said reserve space, said code comprises additional code for signaling a complete failure of
3 said I/O operation.

1 25. The computer program product of Claim 16, wherein said code for dynamically
2 expanding step comprises:
3 code for calculating an amount of space required to complete said I/O given a value of
4 currently available space within said file system ; and
5 code for dynamically expanding said file system by at least said amount of space
6 required.